

III

MONUMENTS AND THE STRUCTURE OF PRE-URBAN SOCIETIES

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In the development of research it often happens that what seems at first a rather specific, and indeed minor, point soon emerges as a focus for thought and for investigations which later assume a much larger significance. The particular issue in question then comes to be regarded as a specific instance, at the time in question the first of its class to be recognised, of a very much wider and more interesting problem. Such was the case with the monumental burial and henge monuments of Britain, whose study opened the way to the discussions of the social organisation of those societies showing some degree of complexity, yet not at that time attaining the level of organisation seen in urban societies or states. Just as the consideration of comparable societies in Polynesia led to the development of the concept of the 'chiefdom' in anthropology, and to much wider discussion of the general issues surrounding it (Sahlins 1958), so the reconsideration of the European monuments was a step towards the broader consideration, on the basis of actual archaeological data, of the structure of ranked societies (e.g. Renfrew and Shennan 1982). The work of many writers who have contributed to this discussion, some of them mentioned in this introductory paper, although focusing primarily upon archaeological issues within the prehistory of Britain, is in reality of much wider significance. It develops for the first time some important general issues in the archaeology of pre-state, or rather non-state, societies.

When I first began to read archaeology seriously, one of the most intriguing problems for the prehistorian was presented by the various impressive monuments from the remote past which obviously pre-dated the development of urban life in the areas in question. In Britain, Stonehenge is the most famous of these, and the whole range of megalithic tombs which are of widespread distribution in western Europe. The northern United States have their major monuments too, and many other places, from Polynesia to Malta have comparable constructions. Initially these sites were usually explained in diffusionist terms as the result of some colonial-

ist expansion from the homelands of the major early civilisations. Great Zimbabwe, for instance, was first seen as the result of activities originating in western Asia, and only more recently has its fundamentally African inception been widely recognised.

These major works of construction are the very obvious products of groups of people who are otherwise archaeologically much less conspicuous. They are, moreover, very often *collective* works, the products of the labour of larger groups than might at first sight be expected to have cooperated together at the time in question. And the ultimate issue which they raise is the appropriate method of approaching archaeologically those societies which are structured above the household level, but which are not to be considered as state societies. The old distinction between kingdoms and acephalous societies (Fortes and Evans-Pritchard 1940) is seen, in the light of this approach to be a considerable over-simplification. Instead we find ourselves contemplating the whole range of social formations displayed by non-state societies.

The first of these papers to be written (chapter 8) was conceived in response to a specific need of the time. The radiocarbon revolution was just confirming what some of us had long suspected, namely that the megalithic monuments were a good deal earlier than their supposed precursors in the East Mediterranean, and that the existing and widely accepted views of their origin would have to be scrapped entirely. At that stage the necessity was not so much to arrive at an entirely satisfactory explanation for them as to show at least that an explanation in social rather than diffusionist terms was a possibility at all. To undertake this task effectively it was necessary to set the argument into some kind of coherent context of thought.

The obvious framework readily available was that constructed by Sahlins (1958) and by Service (1962), where beside the rather standard ethnographic and archaeological concepts of the tribe and the state, they added the chiefdom. Although these terms are often called 'neo-evolutionary'. I have never seen any force in the criticism that they imply some necessary progression: the archaeological record is full of chiefdoms which did not turn into states, and of societies at a tribal level of complexity which did not change into chiefdoms. There is no implication here of some prescribed unilinear path in evolution. Indeed in my own view there is little justification for the present fashion of categorising the terms 'band', 'tribe', 'chiefdoms' and 'state' as evolutionary or 'neo-evolutionary'. They are simply descriptive or taxonomic categories of social

forms, and carry with them no necessary evolutionary connotations.

A much more relevant criticism today is that simply to designate a prehistoric society as a chiefdom does not in itself advance matters very much. A broad taxonomy of social groupings, classed as 'chiefdoms' or as 'states' may be convenient for some purposes, but we are not very much the wiser about a society simply by agreeing that it can properly be termed a 'state' within our definition of that concept. Binford (1983, 390) has recently made this point: 'Many may recognise the methodological bind that these tactics forced on the archaeologist. All argument from archaeological facts is of necessity an argument of relevance. All that can be judged is the appropriateness of the model to the case in question.' This point, applied to chapter 8 here, certainly has some force. Simply to apply a taxonomic term to a specific case does not in itself achieve much. But to say this may overlook the point that the purpose of such a taxonomy is to facilitate research at a particular stage in the development of the discipline, not to attain some ideal of classificatory perfection. Nor has the concept of chiefdom yet outlived its usefulness (Carneiro 1981): it is not uncommon for writers attempting to deal with the problem of the origin of the state to claim as state societies communities which on the criteria discussed here would more readily be classed as chiefdoms (e.g. Haas 1982, 213). To do this risks falling back into the old, over-simple dichotomy between 'acephalous' and state societies, which the introduction of the term 'chiefdom' was specifically designed to overcome.

The use of such terms opened the way to the comparison of prehistoric societies showing some degree of centralised organisation with more recent societies, such as those of parts of Polynesia, as undertaken in chapter 7. The purpose of such analogies in my view is not precisely what is often claimed for them. It removes the discussion from the specific single case to a more general level, and allows the actual case in question to be seen as possibly a specific instance of a more general process or phenomenon. For me the purpose of comparing Tonga with neolithic Britain, and the monuments of Easter Island with some of the European megaliths, was not to compare this or that specific feature with the intention of establishing some kind of equation between them. At the more superficial, heuristic level it demonstrated usefully that major monuments, analogous in scale to those of prehistoric Europe, certainly could be produced and have been produced by non-urban societies without the benefits of any very advanced technology, and that the social organisation of such societies is to a considerable

extent known to us today. More interestingly it suggested whole further fields for investigation. The possible spatial regularities in the distribution of the south-British long barrows or henge monuments could be grasped, in the light of the spatial organisation of the Easter Island tribal groups and of their ceremonial centres, as possible instances of more general organisational principles. They highlighted and confirmed the fruitfulness of a territorial approach to the problem. In this way, and in others, the analogy serves as a stepping stone to more coherent theoretical formulations. I do not see ethnographic analogy as an end in itself. At the superficial level it can lend plausibility to suggested explanations, by showing that in other and better understood cases such explanations can and do indeed work. At the general level the analogy is a means towards the formulation of hypotheses and of theories.

The issues which arise from these specific cases are very wide ranging (see Gilman 1981). The most obvious is the whole question of 'ranked societies', to use the term favoured by Fried (1967), although it too inevitably suffers from the limitations inherent in any attempt to classify human societies in a simple and coherent way. That question was dealt with in an influential and wide-ranging paper by Peebles and Kus (1977), where the possible archaeological correlates of ranked societies were reviewed. Much recent work on the analysis of funerary assemblages, especially those arranged in cemeteries of single graves (e.g. Shennan 1975) has focused on the same problem. There is now the growing realisation that the degree of prominent ranking is only one of the relevant issues. Another, well developed by Earle (1977), is the extent to which the central figure in such a society, who commands greatest prestige and power, really does act as a redistributive agency in the manner proposed by Sahlins (1958), and thus increase the overall efficiency of the social group by the redistribution of agricultural and other production. This image of the friendly chief has been attacked by some as the product of a western capitalist society, all too ready to believe in the economic benefits bestowed by corporate institutions, on much the general principle that 'What's good for General Motors is good for America'. The most prominent alternative view is to see the chief as perpetrating a 'rip-off', and manipulating the symbols of his exalted status in order to hoodwink the masses, in a classic Marxist exemplification of exploitation in a pre-class society.

There is now a general consensus (Smoothy 1981) that, at least in south Britain, the monuments represent at least two developmental stages, reflecting significant social transformations, and that to-

wards the end of the neolithic period there were further significant social developments associated with the emergence of exchange networks furthering the acquisition of prestige goods. It is now widely acknowledged that the megalithic tombs, as indicated in chapter 6, served as territorial markers for segmentary societies (Darvill 1979 and 1982; Chapman 1981; Renfrew 1981), and as such had both social and symbolic significance. Tilley (1981, 381) in an interesting paper has gone further, suggesting that the megalithic tombs 'may be the material manifestations of a system of social control . . . designed to bolster and represent as pre-ordained a hierarchical system of social control and established social order.' This is an interesting extension of the Marxist agonistic model applied to a very simple level of society. For it is not claimed by Tilley that the societies building the megalithic tombs were ranked societies or chiefdoms such as were responsible for the great henge monuments. Instead Tilley (in press) argues, with an acknowledgement of the debates among neo-Marxist anthropologists as to whether 'exploitation' can appropriately be seen in such simple, segmentary societies (Kahn 1981), that the megaliths can be viewed as the product of, and to some extent the means of, exploitation of the younger members of the group by their elders. These ideas have not yet been widely assessed, but it is clear that they raise interesting new questions for the relatively simple, segmentary societies of the kind discussed in chapter 6. Hodder has also written recently about the symbolic significance of constructions such as the megalithic tombs (Hodder 1982, 218), drawing upon recent fieldwork in the Orkney islands (Renfrew 1979). In the application of a structuralist approach he was, however, anticipated by Kinnes (1975), who showed how the typology of such monuments may usefully be seen in terms of some rather simple general principles of design (see also Fleming 1972). Other symbolic aspects of the use of the monuments have been considered by Shanks and Tilley (1982) and by Hedges (1983).

The second major developmental stage, represented by the emergence of larger centres, including the henge monuments, is discussed in chapter 8. Recent work has quite properly moved on from the concept of chiefdom which, while remaining descriptively appropriate, soon has little more to add to the discussion, and has stressed their function as ritual centres. The manpower estimates outlined in Chapter 8 have been subjected to revision (e.g. Startin and Bradley 1981), but the essential point remains valid that the causewayed camps of south Britain are an order of magnitude

greater in their manpower requirements than the average megalithic tomb or long barrow, and the large henges (or 'megahenges') an order of magnitude larger again. One question not yet adequately resolved is the wider range of contacts implied at this time by the distribution of the henge monuments themselves, and by the specific ceramic form, Grooved Ware, which is often found with them (Whittle 1981). In an interesting paper (Bradley and Chapman, in press), the notion of peer polity interaction has been extended to illuminate this question, and it is clear that the symbolic aspects of the monuments and of their accompanying artefacts will be crucial in reaching some explanation of their very widespread distribution.

It is also now very widely accepted that, at the end of the neolithic period, there was a further major social change, associated with the decline in the major ritual centres and with the development of single burials accompanied by prestigious gravegoods. The earlier of these include finely made ceramic beakers and later, in the so-called Wessex culture, there is a broader range of prestige materials. This shift now seems of very much wider significance (Renfrew 1974, 74):

At one extreme lie societies where personal wealth in terms of valuable possessions is not impressively documented but where the solidarity of the social unit was expressed most effectively in communal or group activities. And at the other are societies where a marked disparity in personal possessions and in other material indications of prestige appears to document a salient prestige ranking, yet often without evidence of large communal meetings or activities.

Societies of the first kind may be termed *group-oriented*. Those of the second kind are here termed *individualising*, since the role of the individual is so much more marked: one might alternatively have termed them *personalising* or *aggrandising*.

These changes have been fruitfully considered by a number of writers (e.g. Burgess and Shennan 1976, Shennan 1982, Thorpe and Richards 1982), and from their work there emerges the notion of a broad network of exchanges. The prestige goods which passed along this network are seen as legitimising and enhancing the status of the individuals situated at its nodes. At this point the neo-Marxist (e.g. Rowlands 1980) and structuralist (e.g. Hodder 1982) strands of contemporary thought do, to a considerable extent, merge with the processual views presented here. There is agreement that the ritual means of sustaining solidarity among the social group, reflected in the henges, was largely superseded by a system of personal

prestige, where the position of high-status individuals was enhanced by the ownership of prestige goods. This emphasis upon the social significance of material goods (Douglas and Isherwood 1978) is considered again in relation to the Aegean in chapter 10.

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6

MEGALITHS, TERRITORIES AND POPULATIONS

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For more than a century the stone-built monuments of northwestern Europe, belonging as we now know to the fourth and third millennia BC, have been regarded as a unitary phenomenon, the product of a single sequence of events. They have always presented a special problem, since they represent in skill, in organisation and in manpower a level of achievement not surpassed in some areas until Roman times or the Middle Ages. Basic similarities in form and technique among the 'rude stone monuments' of western Europe, as well as those of north Africa and India, were brought out in 1872 by Fergusson in a masterly survey. And since that time it has come easily to scholars to see these structures, or the European ones at least, as linked by a single historical process. That is to say that their derivation, in form and in function, could be traced back ultimately to a single region of origin. Their appearance in a given area was then the product either of imposition – the direct introduction of new forms and practices by an intrusive population – or of acculturation, the borrowing of such customs by an existing population from an intrusive one. The notion of a 'spread' of megalith builders, or at least of 'the megalithic idea', was set out authoritatively by Montelius and further analysed in impressive detail in several works by Childe (1925, 1957). Early suggestions of a European genesis for the entire phenomenon did not find wide acceptance. But the general notion of a megalithic spread or colonisation did not prevent the detailed discussion of regional variants, or the full elaboration of a typology capable of comprehending the wide varieties of form (e.g. Daniel 1958). So the attractive simplicity of a unitary explanation did not necessarily render it a simplistic one.

Already, before the full impact of radiocarbon dating was felt, and then the calibration of the radiocarbon calendar, a fundamental

tenet of the original 'single spread' concept was undergoing critical examination. For since the time of Montelius (1899) it had been axiomatic that the ultimate source for the practice of collective burial in monumental tombs built of stone was the eastern Mediterranean:

One does not have to probe deeply into the study of the conditions here in the north during the stone age. . . to see that the original homeland of the dolmens cannot be sought in north Europe. They could not have spread from here to the southern shores of the Mediterranean, to Palestine and to India. The entire discussion here shows that this would be absurd. So powerful a movement, able to influence the burial customs of so many and widely distributed peoples, simply cannot have originated here, thousands of years before our era. It is indeed remarkable enough that, originating in the Orient, it should already have reached us here at so early a date.

The traditional picture, taking up the idea of Montelius, became the arrival of east Mediterranean colonists (Blance 1961) or at least influences, in Spain. From here, and also from south France the custom of building megaliths supposedly spread northwards along the Atlantic seaboard as far as Britain and ultimately Scandinavia.

A central and fundamental element of this view is that the communal burial practices of Iberia had an east Mediterranean origin. In 1965 this was called into question (Renfrew 1965 and 1967) on traditional archaeological grounds. And indeed the wider application of radiocarbon dating makes it now chronologically untenable (Renfrew 1973a). This is of course true whether we are dealing with simple radiocarbon dates, or using dates calibrated by the bristlecone-pine dendrochronology. The tree-ring calibration in one sense simplifies the picture by permitting us to speak, at least approximately, in calendar years. But it is quite sufficient simply to use uncalibrated dates for the east Mediterranean and for western Europe in order to show that the Montelian view is erroneous.

We are forced, therefore, to contemplate a European origin or origins for the neolithic monuments. Much of the traditional pattern of explanation can, however, still be preserved if we retain a unitary view, postulating a single place or region of origin, and if we situate that seminal area in Iberia. For then the remaining diffusionist picture of the spread north from Iberia can be retained with a minimum of modification. But alas, the radiocarbon dates from Brittany are so far the earliest available, and it looks as if, should we desire a seminal centre from which all the European megaliths are

to be derived, Brittany is a stronger candidate.

The objective of this paper, however, is to question whether a single origin, in this restricted sense of a single seminal centre of diffusion, is in fact an appropriate model for the European monuments. In the next section it will be argued that we can detect indications of innovation in several different areas. It will be argued that these should be explained in terms of factors operating locally (whether or not there may have been some measure of contact between any or all of the areas in question).

Indeed it is relevant to ask whether there is really any unified distribution of 'megalithic tombs' in western Europe, despite the admitted concentration of monumental stone structures at the west of the continent, and their rarity or absence in central and eastern Europe. If the monuments in each area are to be explained in terms of factors operating locally, may not these various factors be different ones in many cases? And are we not perhaps too hasty in terming all of these monuments 'tombs'? It has often been suggested that some may have had a significance that was not primarily funerary. Indeed already earlier in the century it was realised that some structures, literally megalithic in terms of their construction, should be considered apart – the stone circles of Britain for instance, and the temples of Malta. Somewhere along the line the tombs of Sardinia and the Balearic Islands were also dropped from the discussion, and for reasons not entirely clear are considered less 'megalithic' than the passage graves of Brittany or Iberia, many of which are built of small stones. Certainly today there can be no easy assumption that simply by selecting monuments in different parts of Europe, that happen to be approximately contemporary, and labelling them 'megalithic tombs', we therefore make them a part of some unitary phenomenon. There is no *a priori* reason to expect a single, unitary explanation. It is important, then, to recognise that it is a taxonomic decision of our own which leads us to apply the term 'megalithic tomb' to monuments as different as the *dysser* of Denmark and the passage graves of Almeria.

And yet, at the same time, it is difficult to escape from the feeling that there *is* a certain homogeneity, both in time and in space, of the distribution of these monuments once so defined. None of them has been convincingly dated yet to before 4000 bc in radiocarbon years (c. 4800 bc in calendar years, according to the calibration proposed by Clark (1975), which is used throughout this paper). And in few cases can the construction of a stone-built chamber for communal burial in the area be set after c. 1800 bc in radiocarbon years (c. 2300

bc in calendar years). Moreover while the distribution of such monuments in western Europe may not be a continuous one, their absence from regions more than c. 300 km from the Atlantic or North Sea coast is striking. Such monuments are simply not found in central Europe.

So it seems reasonable to recognise that there does indeed seem to be a coherence, indeed a measure of unity, underlying the distribution. What we no longer have to accept today, however, is that such a coherence is the result of a single complex of historical events, a single spread from one seminal area – whether in Iberia, or Brittany or Denmark – which stands at the head of all later developments. Such a spread from a single focal area cannot yet be excluded, but nor should it any longer be assumed, now that the notion of east Mediterranean origins can be dropped.

A widespread, Atlantic distribution in the absence of a single colonising movement or megalithic spread need not be a paradox. It requires simply that a particular set of conditions existed in the Atlantic region at this time, conditions which were not seen elsewhere in Europe, and that these favoured the construction of stone monuments by the small-scale societies of the time. Such a general formulation, if it can be achieved, would explain for us the essentially independent genesis of stone monuments, no doubt of widely different forms, in several areas. It might also explain the adoption of similar customs in adjacent areas, and do so in such a way as to give detailed, locally-operating reasons for such an adoption, rather than appealing to migration or diffusion as adequate explanations in themselves. For of course the adoption of an explanation that is, in the traditional sense, non-diffusionist, in no way denies the mutual influence of neighbouring communities.

In what follows a first attempt will be made to offer such an explanation, after a brief statement of the chronological evidence which makes possible the discussion in terms of a number of essentially local and independent developments. The initial step in the argument is to see in these monuments an expression of territorial behaviour in small-scale segmentary societies. The second step is to suggest that such forms of territorial behaviour may be particularly frequent in small-scale segmentary societies of this kind in circumstances of population stress. And finally it has to be shown that there are grounds for thinking that such population stress was in fact experienced along the Atlantic/North Sea seaboard, but was not felt among approximately contemporary communities in central or eastern Europe. I do not claim that the explanation will be an

entirely satisfactory one, but it does at least offer a fairly high degree of generality. Among other things it suggests that the construction of such monuments is in some cases likely in remote islands, such as those of the eastern Pacific, where monuments of this general kind are in fact seen.

Crucial to the entire approach are two concepts: continuity and acculturation. For it is suggested here that the genesis of the monuments is to be considered in terms of *local* development, rather than of the direct importation of foreign ideas. At the same time the demographic circumstances which gave rise to these developments arose as a result of the new and imported techniques of farming. In this very real sense the megalithic monuments are thus the result of 'acculturation'; not the passive acceptance of new ideas handed down from a centre of 'higher' culture but a more dynamic working of acculturation processes, where the existing local conditions together with the arrival of new factors work mutually to generate something new and emergent, which was not immanent in either component.

Chronological Questions

The traditional view of the origins of the stone-built monuments of north-western Europe, developed by Montelius and Childe, was clearly expressed in the late fifties by Childe (1957) and Daniel (1958). As already indicated it proposes an Aegean or east Mediterranean origin for the collective tombs of Iberia, and a derivation from these of the other European monuments. This view can be challenged on traditional archaeological grounds – that there is no good evidence for the initial 'colonisation' of Iberia by the ancestral megalith builders, nor for their movement northwards from Iberia. Indeed perhaps at present we are focusing excessively on chronological questions to the detriment of other classes of evidence. Nonetheless the development of radiocarbon dating, its dendro-chronological calibration and the use of thermoluminescence dates, at last offer an objective time scale for European prehistoric inter-relationships. It seems to exclude some aspects of the traditional view, and opens the possibility of several independent centres of origin for the monuments.

The Aegean and the West Mediterranean

The arguments against the 'colonist' view have been set out in a recent book (Renfrew 1973a) and in an earlier paper (Renfrew 1967). The only *points de départ* for the colonists that have been

argued with any vigour in recent years are Early Minoan Crete (with the Mesara round tombs as the prototypes for collective burial) or the early bronze age of the Cycladic Islands, or just possibly early bronze age western Anatolia (although there are no prototypes for collective burial as yet at the relevant times in the eastern Aegean).

Probably no serious worker in the field would date the Early Minoan round tombs much before 2800 BC, nor the Keros-Syros culture of the Cyclades as early as that. Nor would the foundation of Troy be set by many before 3200 BC in calendar years, nor the inception of the Cycladic Grotta-Pelos culture much earlier (Renfrew 1972, 221). The Early Bronze 2 period of the Aegean may perhaps be dated by the radiocarbon determinations for the Korakou (ΕΗ II) culture at Lerna which range between 2262 ± 56 bc (P-317) and 1887 ± 65 bc (P-312), the approximate equivalent of 2900 BC to 2200 BC in calendar years (following the Suess/Clark calibration).

Already the radiocarbon dates, for what is acknowledged to be a developed phase at Los Millares, make improbable a derivation for the origin of the settlement or its tombs from the instances cited above. For dates of 2345 ± 85 bc (H-204) and $2430 \pm$ bc (KN-72) may be calibrated to between approximately 2960 and 3350 BC (following Suess), which are already too early.

Moreover the dates for the Portuguese dolmen of Carapito I (2900 ± 40 bc: GrN-5110; 2640 ± 65 : GrN), together with those from Orca dos Castenairos (3110 bc; 2660 bc; laboratory number not cited: Leisner and Ribeiro 1968) calibrate to between 4200 and 3400 BC. There can be no question of derivation from the Aegean instances hitherto cited in the literature. These arguments of course gain added force when the very early dates for Brittany are taken into consideration.

It should be noted that no undue weight is put here upon the calibration. We may either compare radiocarbon dates with radiocarbon dates for each region, speaking in radiocarbon years bc, or after calibration compare calendar dates in years BC.

Iberia

There are as yet rather few radiocarbon dates for Iberian tombs, so that it is difficult at present to build up a plausible chronology for Iberia based on radiocarbon alone. The available data have recently been supplemented, however, by the publication of an important series of thermoluminescent dates for Iberia (Whittle and Arnaud,

1975). In general thermoluminescence (TL) is not considered as accurate a method as radiocarbon dating, and sometimes problems occur with specific sets of material – as may at present be the case with the vexed question of Glozel. But the new evidence is to be taken seriously, and in fact it harmonises tolerably well with the existing radiocarbon dates. It should be remembered that the TL method, not being dependent upon the concentration of radioactive carbon in the atmosphere, is not subject to the same calibration (whatever its other limitations), and the dates are to be regarded as expressed in calendar years BC. TL dates should therefore be compared with calibrated radiocarbon dates, and never with uncalibrated ones.

The TL dates have been used to construct the chart shown in figure 1, to which selected radiocarbon dates have been added, allowing the formulation of four phases for the Iberian neolithic/chalcolithic, preceded by the Portuguese middens. It should be admitted that at this stage any such table implies a measure of selection: it is an interpretation, and hence in part subjective. Much more information will be needed before it could be otherwise. Moreover the dates have been set out without a proper concern for the different regions of Iberia, producing five broad phases. Obviously a satisfactory chronology will ultimately have to take account of regional variations.

The most striking point in figure 1 is the harmony between the TL dates and the calibrated radiocarbon dates for the early Portuguese dolmens. Gorginos and Poço da Gateira give TL dates between 4700 and 3800 BC, averaging 4440 and 4510 BC respectively. The radiocarbon dates for Carapito I, Orca dos Castenairos and Seixas, lying between 3110 and 2640 bc (GrN-5110 for Carapito, GrN-5734 for Seixas), calibrating to between 4200 BC and 3400 BC.

These dates may be taken to establish a date range for the developed neolithic. The Cardial neolithic of Coveta del Or establishes the early neolithic, phase I, of c. 5500 to 4900 BC, preceded by pre-neolithic represented by the earlier dates for the Portuguese shell middens.

The succeeding phase III, c. 3400 BC to 2700 BC includes the radiocarbon dates for Los Millares, and the TL dates for Comenda de Igreja and the settlements at Serra das Baútas c ('neolithic'), Castelo do Giraldo and Peñedo de Lexim c ('neolithic'). This I am calling early chalcolithic, since sites like Los Millares may be so regarded, although other contemporary sites will have a more traditional, 'neolithic' aspect.

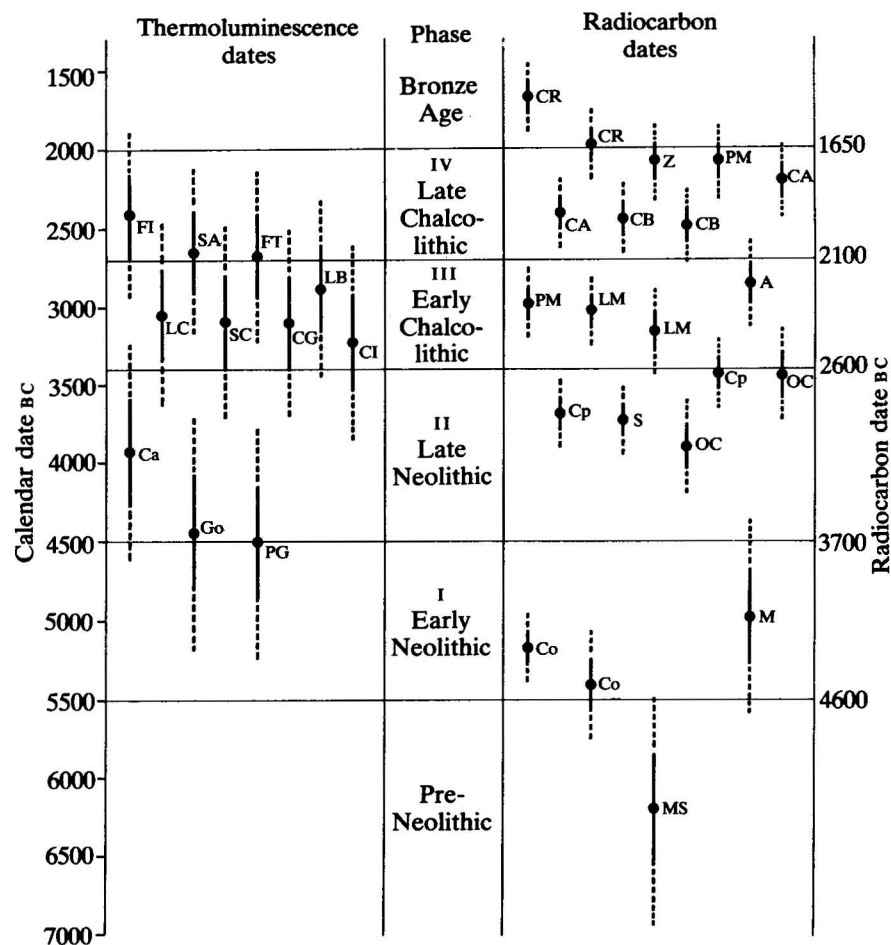


Figure 1. Comparison of calibrated radiocarbon dates and thermoluminescence dates for the Iberian neolithic/chalcolithic.

The radiocarbon dates are plotted in calendar years (i.e. after calibration, using the corrections suggested by Clark (1975)). The corrected date is shown by a dot, the standard deviation is shown by an unbroken line and the second standard deviation by a broken line (so that there is a probability of ~95% that the true date lies within the range indicated by the broken lines). Thermoluminescence dates in calendar years BC (following Whittle and Arnaud 1975) are shown with an associated error of two standard deviations, the second again indicated by a broken line.

This is followed by phase IV, late chalcolithic, from c. 2700 BC to 2000 BC, with TL dates for Farisoa, Serra das Bautas A ('chalcolithic') and Lexim B ('chalcolithic'), and radiocarbon dates for Almizaraque, Praia das Maças, and at the very end of the period Zambujal. The present pattern of radiocarbon dates does not allow us to separate a beaker period from the early bronze age El Argar culture, but more dates may make this possible.

This first crude outline for an Iberian chronology at least allows us to draw some preliminary conclusions about the early tombs. Our Period III, from c 3400 BC to 2700 BC encompasses both the Anta grande da Comenda da Igreja, a large passage grave in the Alentejo, and tomb 19 at Los Millares. This, then, is a period of accomplished passage grave building both in Almeria and in the west.

The preceding phase, c. 4600 to 3400 BC, yields both TL and radiocarbon dates for the simpler Alentejo tombs, including Anta 1 Poço da Gateira and Anta 2 Gorginos. (It should clearly be noted that the calibrated radiocarbon dates do not yet fall earlier than 4100 BC). It seems a reasonable suggestion that the early Almerian round tombs may also date within this period.

It would be fair to say that the radiocarbon chronology implies that the Portuguese dolmens have begun by 4000 BC, and that passage graves such as those of Los Millares were under construction by 3000 BC. The TL dates would set the beginning of each period earlier, quite plausibly by some four centuries.

Brittany

The radiocarbon chronology, with its tree-ring calibration, has already been the subject of systematic study (Giot 1971), so that it is necessary here only to review the salient points. In the first place

It is clear that the early ('cardial') neolithic (Co) was under way by 5500 BC, and that built stone tombs (Go, PG, Cp, OC, S) were being constructed by 4500 BC. The early chalcolithic, associated with the beginning of the Los Millares period (LM), began shortly after 3500 BC, and beakers (Z, CA, CB) in the later chalcolithic around or shortly after 2500 BC. The Argaric bronze age (CR) was under way by about 2000 BC.

Evidently this simple table, which does not attempt the necessary analysis on a more detailed regional basis, is only an outline sketch. But already it is clear that an east Mediterranean origin for the construction of built stone tombs, and probably for the supposedly 'colonist' settlements, is unlikely on chronological as well as on other grounds.

there is a substantial series of dates for passage graves before 3000 bc in radiocarbon years. The series from Barnenez in particular is consistent and impressive (A: 3500 ± 150 , Gif-1310; entrance of B: 1250 ± 120 , Gif-1311; F, chamber: 3600 ± 140 , Gif-1556; F, passage: 3150 ± 140 ; Gif-1116; G: 3800 ± 150 , Gif-1309). If we exclude the late date for the entrance to chamber B as due to later activity, this gives a mean of c. 3500 bc, calibrating to around 4300 BC.

It should be noted that so far the passage grave is the earliest form of monument in Brittany for which a consistent date emerges.

Great Britain and Ireland

The calibrated dates for the British Isles have been reviewed in a recent volume (Smith 1974; Henshall 1974). We have several dates for earthen long barrows in south England, in Yorkshire and in Scotland (Dalladies) in the time period 3200 to 3000 bc, calibrating to c. 4200 to 3800 BC. Radiocarbon dates for Monamore Cairn (3160 ± 110 , Q-675), Waylands Smithy (2820 ± 130 , I-1468) and Carnabane (2980 ± 80 , UB-534) suggest that chambered cairns in Scotland, England and Ireland respectively were little if any later.

In each area the stone-built tomb takes on its own characteristic form, little resembling either the Portuguese dolmens or the Breton passage graves.

The earliest Irish passage grave date so far is from Knowth (2975 ± 165 bc), and dates for Orcadian passage graves are later than this.

Denmark

The effect of the tree-ring calibration upon the neolithic chronology of Denmark has been conveniently summarised by Tauber (1972). Passage graves can be dated to before 2500 bc (Jordhøj, 2540 ± 120 ; K-978), and there is the early date for the non-megalithic long grave of Konens Høj of 2900 ± 100 bc (K-919), calibrating to c. 3600 BC. An evolution in Denmark from langdyss to passage grave seems very probable.

Discussion

The most important aspect of these dates, from the standpoint of origins, is that each area has its own characteristic early form. Later on, as architecture becomes more grandiose, a more ambitious chamber entered by means of an entrance passage, develops in many, or is introduced.

In Almeria, the round tomb and in the Alentejo the simple

dolmen make their appearance in Iberian II, the late neolithic, by 4000 BC, or indeed by 4400 BC if the TL dates are accepted. In Brittany, the Breton passage grave, as exemplified at Barnenez is seen comfortably before 4300 BC. In Britain the unchambered long barrow is seen before 4000 BC, with Clyde cairns in Scotland, court cairns in Ireland and Severn-Cotswold tombs in England at about the same time, or a couple of centuries later. And in Denmark we have the long graves making their appearance by 3600 BC, although the development of the passage grave is later.

In each of these areas, therefore, a case can be made for the independent emergence of burial monuments of stone within a few centuries of 4000 BC in calendar years, just a little before 3000 bc in radiocarbon years. So far the Breton tombs are certainly the earliest known.

The corbelled passage grave first make its appearance in Brittany, but a perfectly good case can be made for its independent invention in Almeria, starting with the Almerian round tomb as prototype. Whether or not a similar case can be made in Ireland for the passage graves remains to be seen: it is quite possible that maritime contacts with Brittany influenced the development of Irish architecture in the direction of corbelled passage graves. Similarly, while a case can be made for the local development of corbelled roofing for the Orcadian passage graves, contacts to the west, ultimately with Ireland are not necessarily excluded.

The only point which has to be made here is that in each of the four or five regions discussed, a fair case can be made for the local development of burial in stone monuments. No doubt the evidence still allows of different and more traditional interpretations, but there are no grounds for simply assuming them to be correct.

Instead, in what follows, an attempt is made to consider the monuments as representative of the societies which made them, and to consider the circumstances which gave rise to their construction.

Territory and Segmentary Society

In order to discuss the origin of the monuments, it is necessary to have some idea of what they represented to the societies which built them. This implies an understanding of their function – not just in the sense of the immediate use to which they were put (which in some cases was evidently burial) – but of what they symbolised to the societies in question. Naturally this will have differed from society to society, and as indicated at the beginning of this article, it is not necessarily the case that the megaliths are a unitary pheno-

menon: their function and meaning could have been entirely different in different areas.

However, there are some underlying similarities in several regions, from Almeria to Jutland, and a generalisation is here risked that may hold for many, although not for all, of the monuments. It is suggested that the monuments functioned as territorial markers for segmentary societies. And in most regions their function as a place of burial, an ancestral resting place, was central to that symbolic expression of territory.

Territoriality

Territorial behaviour has been recognised for more than a decade as a fundamental aspect of the adaptation of animal populations to their environment, serving to regulate population densities at a lower level than the theoretical carrying capacity calculated on the basis of the available food supply (Wynne Edwards 1962). And some features of the territorial behaviour of animal species have been recognised in human behaviour, both of individuals and of groups, although it does not follow that this behaviour is instinctive.

Territorial behaviour implies the habitual use of a specific, localised area which constitutes the sphere of influence of the individual or the group. Often foreigners are excluded from this territory and from access to its resources. And one of the concomitants of this territorial behaviour is often a spatial identity, an awareness which membership of the territorial group confers, reflected both in marking of individuals (by characteristic behaviour or apparel) and of the territory. Often there is a territorial symbolism or iconography which may also involve flags or insignia.

A group can show territorial behaviour without its membership being defined in terms of the territory. Indeed it is sometimes suggested that an important feature of state society is that the members of that society are defined as such by their residence within its territorial boundaries. Often in small-scale societies group membership is defined in terms of kinship: they can nonetheless show an acute territorial awareness.

Segmentary Societies

Most of the social organisations with which we have to deal in the modern world are hierarchically structured, with chains of command, and related to them a hierarchy of places, with controlling centres. Segmentary societies are not like this: they lack the centralised, hierarchical structure of the chiefdom or state. They are small

communities, not usually numbering more than a few hundred persons. As Colin Turnbull (1972) puts it, they are 'smallscale societies', and frequently non-literate. In particular they display segmentary organisation, which implies simply the repetition of equivalent groups. They are cellular and modular: cellular in that the groups are clearly defined and operate in many ways independently, and modular in that they are of approximately equal size. The segments are autonomous, economically and politically, and usually number between 50 and 500 persons. In segmentary societies the primary functioning unit – normally a residential unit, whether a village or an association of dispersed houses – is the primary segment, 'a self-sustaining perpetual body, exercising social control over its productive resources' (Sahlins 1961, 325).

In recognising a segmentary society, whether from archaeological or other evidence, there are two basic criteria to meet:

- (i) that the society is indeed composed of permanently functioning small groups of this kind, and
- (ii) that the groups are not subordinate parts of an effective and larger political and economic entity whose hierarchical control diminishes the autonomy of its constituent parts.

The latter is an important part, for in the present discussion we are particularly interested in the symbolism of such communities. Permanent membership of a larger functioning unit would no doubt carry with it its own symbolism, allegiances and beliefs.

Normally membership of a segment is determined either by descent or marriage, so that the social component of the segment is some kind of kinship group or kindred.

Archaeologically such societies may be recognised when the two above criteria are fulfilled, together with a third. They can be expressed anew in the following conditions:

- (i) that a pattern of simultaneously functioning sites be recognised, whose location indicates spacing rather than clustering, and in this sense mutual repulsion rather than attraction. Any fairly regular spacing of nodes implies a possible division of the space between them into cells around the nodes.
- (ii) that the territories so recognised are generated by the activities of the living members of such societies rather than by specialised territorial behaviour of cross-cutting groups.
- (iii) that there be no hierarchy of places which can be interpreted as indicating a social and political hierarchy.

It seems likely that most settlement patterns of primary village farming, whether in the New World or the Old, reflect segmentary

Monuments and the Structure of Pre-Urban Societies

societies, since they generally, in their early stages, lack any indication of a hierarchical structure.

Monuments as Territorial Markers

In many segmentary societies the territorial division of the terrain is given symbolic expression. Membership of the group, and the land occupied are expressed in rituals, which are often focused upon a specific location. Generally this will be in the heart of the territory, in the middle of its 'home range'. It is intuitively easy to see that this focus may be an important one to the group, particularly if the settlement is dispersed, so that there is no secular centre in the territory, but solely this ritual one. Mircea Eliade (1965, 22 f) has stressed the symbolic significance of occupying a territory: 'Pour vivre dans le monde, il faut le fonder. . . L'installation dans un territoire équivaut à la fondation d'un monde.'

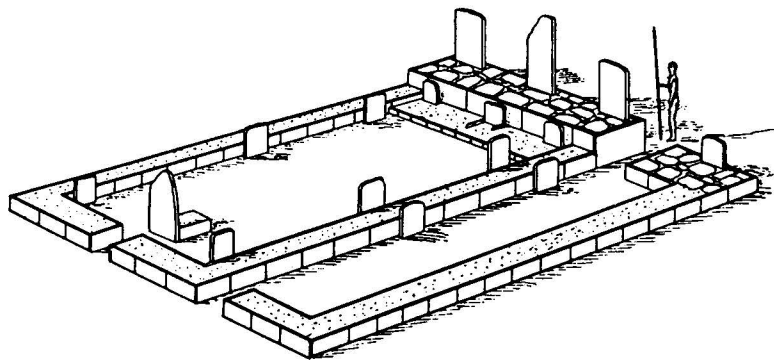


Figure 2. Marae on the Tuamotu Islands, Pacific. These monuments show a territorial arrangement perhaps typical of segmentary societies (after Emory 1947).

With our modern perspective it is easy to forget that the focal place, the centre of a segmentary society, is for that society quite simply the most important place there is. In a very real sense it is indeed the centre of the world. Whether or not its use is linked with the disposal of the dead, or with communal feasting, or with ceremonial gift exchange or with any of the other important rituals and symbolic acts of many communities, the prime territorial marker in many human societies has a significance by virtue of its symbolism which is not a feature of territorial markers of the territories of other species.

In some societies the central focus is a special natural feature of

Megaliths, Territories and Populations

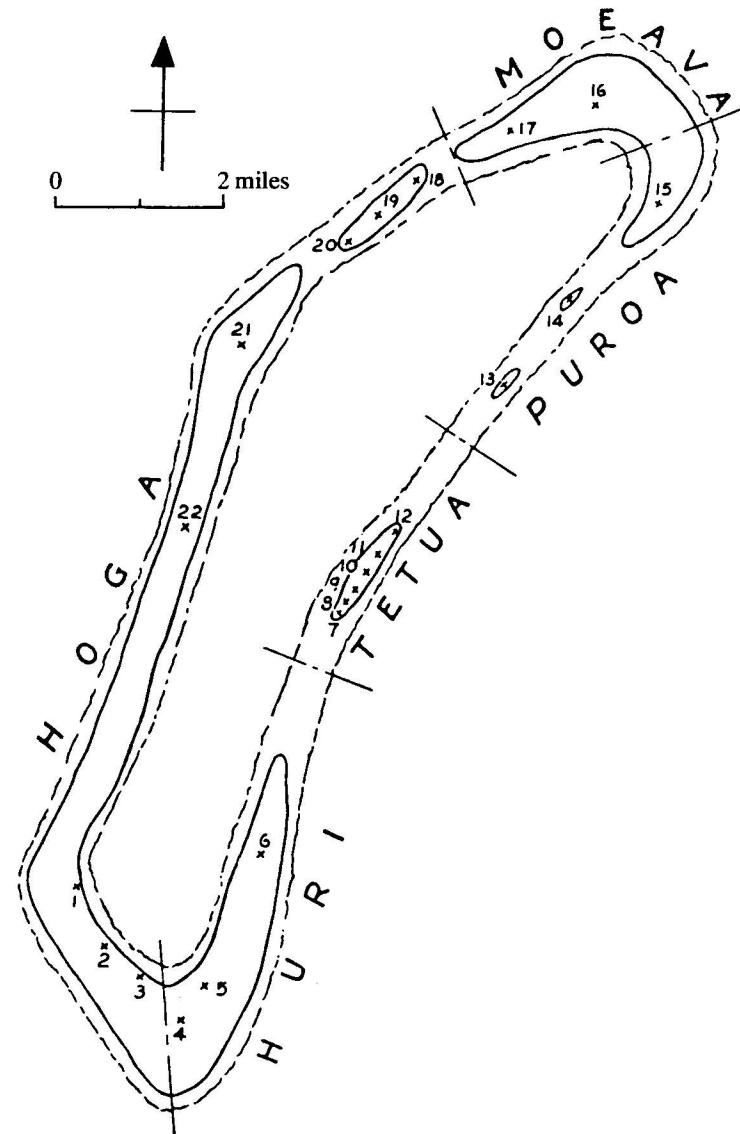


Figure 3. Territorial arrangement of marae on one of the Tuamotu island groups (after Emory 1947).

the territory which has a particular significance – a spring, perhaps, or a grove. But in other segmentary societies the central place is given added significance by marking it in some special way. A clearing may be kept clear of vegetation, or enclosed. Wooden posts or other striking symbols may be erected. And in some cases stones are heaped together to form a cairn. In societies whose membership is defined by kinship, the ancestors have a special significance, and they may in fact be buried at this special place.

An example of stone monuments serving as territorial markers is offered by several of the Pacific Islands. For instance the stone *marae* of the Tuamotu Islands clearly had this function (figures 2 and 3), as well as serving as places of worship, of feasting and of burial. As Emory has written (1947, 20):

The marae, as the property of the kindred, were material symbols of them, and formed a visible connection with the past. Always standing on the land occupied by the kindred, observable by any who might pass, they came to be a seal of ownership. They bound the ancestral spirits and gods of the kindred to the land, putting it under their eternal guardianship.

The European Megaliths

It is my suggestion that we can profitably view the stone monuments of north-west Europe as territorial markers of segmentary societies in the sense indicated above. In many cases they were undoubtedly used for burial: this was indeed their chief function, in a utilitarian sense. But it was clearly not their chief significance, for there is absolutely no need to erect a great monument to solve the simple problem of the disposal of the dead. However restricted the access to such monuments, both in terms of criteria for burial within them, and in the sense of their being hallowed, *tapu* localities, they were clearly public monuments, designed to be seen. They were built by the community to be visible to the community (and the question of visibility will be touched on again below).

Andrew Fleming has implied a part of this in a thoughtful and provocative paper, 'Tombs for the Living' (Fleming 1973, 188): 'Why did neolithic and bronze age man take such pains to design monuments of this kind? I believe that it was because they played a key role in maintaining the structure of contemporary social organisation'. But it is not necessary to follow him also in seeing them as 'attention-focusing devices, part of a signalling system designed to reinforce the existing patterns of leadership', if he implies thereby that the societies in question already possessed a well-defined hier-

archical structure of leadership and command. As we shall see, there is reason to think they were often small, effectively autonomous groups, which need not have possessed permanent leaders. Such small acephalous societies can benefit from the symbolic expression of their identity just as do much larger units where the leadership structure has to be reinforced. In most cases, however, the chambered tombs were collective tombs, and I believe that in general it was collective identity which was symbolised within them. With the rich single grave burials of the early bronze age, on the other hand, for instance in Brittany or Wessex, I believe that we are indeed in the face of individualising chiefdoms (Renfrew 1974), and much closer to what Fleming has in mind.

We are anticipated here by Humphrey Case in seeing some of the megalithic 'tombs' as ritual and territorial centres, rather than as primarily places of burial. After discussing the ritual site of Goodland in County Antrim (Case 1969, 13), he goes on to see analogous functions for the Irish court cairns, the most frequent megalithic monuments of Ireland:

Such rites have a universal and consolatory role in primitive societies. It is not an idle question to ask therefore whether courtcairns, which were probably prominent in Irish life for more than a millennium, were not shrines of a similar kind, despite the great differences in appearance between the Goodland sites and the often elegant cairns with stone-built chambers and forecourts . . . Unless one assumes almost invariable and complete secondary removal of human remains from court cairns (including numerous small fragments of cremated bones) it does not seem very likely that they were originally intended as mausolea; by no means all cairns were built on acidic soils liable to have destroyed bone. Their frequent contents of what is difficult to interpret as other than redeposited settlement debris justify at least an alternative hypothesis: that they were built less as graves for selected kinsmen or to commemorate great men or calm dangerous spirits than to provide by making rites for the needs of the living, like the Goodland sites. . . . The cairns may thus have been the centres about or before which semi-nomadic communities survived in stable adjustment for several generations.

Clearly many of the megalithic monuments of north-western Europe did indeed serve as mausolea, but this does not diminish their possible ritual function as territorial centres. Indeed the unchambered long barrows of Britain were not open for many years,

and thus were not able to act as mausolea over many generations. But there is good reason to think that even when they were no longer used for burial, they continued to have a considerable symbolic significance.

Testing the Hypothesis

This hypothesis, that in several regions the European megaliths served as territorial markers for segmentary societies, is an important first step for the argument about their origins to be set out in the next section. It is desirable, however, to put it to the test.

Clearly, if they are such, they should conform to the three conditions set out above.

The third, that there should be no hierarchy of places, is the easiest to consider. In fact, as I have shown elsewhere (see chapter 8) there is indeed a hierarchy of places in neolithic Wessex, although it does not develop until later in the neolithic period. By considering the labour input required for the unchambered long barrows, the causewayed camps, the major henges, and the two superordinate monuments (Stonehenge and Silbury Hill) it is easy to show that there is a hierarchy here, and plausible to suggest that this hierarchy in the social landscape corresponds to a social hierarchy. So it seems reasonable to speak of the emergence of chiefdoms in late neolithic Britain. No doubt something similar is implied for the Mainland of Orkney at the same time, where the building of chambered tombs was superseded by that of henges. Perhaps the alignments at Carnac likewise speak of some centralisation in what was formerly a segmentary society.

In general, however, the scale of the monuments in some areas is fairly uniform, and this condition in those areas is fulfilled. The examples of Arran and Rousay, below, seem to confirm it although in Rousay particularly there is a considerable range of scale. But at the same time the monuments are of essentially the same kind in each area.

The generalisation has, of course, to be tested in each region in turn. It may well not hold for the great mounds of Brittany, although again it could, if these were formed by accretion over several generations. And it may not hold for concentrated cemeteries of tombs such as those of the Boyne: this concentration and centralisation may be the symbolic expression of some centralisation in society.

The first condition, that we should recognise a pattern of simultaneously functioning sites indicative of territorial spacing, seems

straightforward enough. But it is, of course, greatly complicated by the requirement of simultaneity. For our chronological control is simply not good enough in most cases to demonstrate simultaneity by accurate absolute dating. On the other hand we are undoubtedly helped by the circumstance that many tombs show a long and apparently continuous tradition of funerary use.

I think, however, we can go further, and suggest that whenever the distribution of tombs does give good indication of territorial spacing, some measure of simultaneity of veneration (if not of construction) is implied. For if a tomb went completely out of use and were entirely forgotten, its location would clearly have no further significance. The chances of a subsequent monument being erected nearby would be no less than those of such a monument being erected further away. In other words the placing of the tombs would be random *with reference to one another*. This is not, of course, to say that it would be random in terms of other terrain factors. Indeed, if tombs were used for a brief period and then

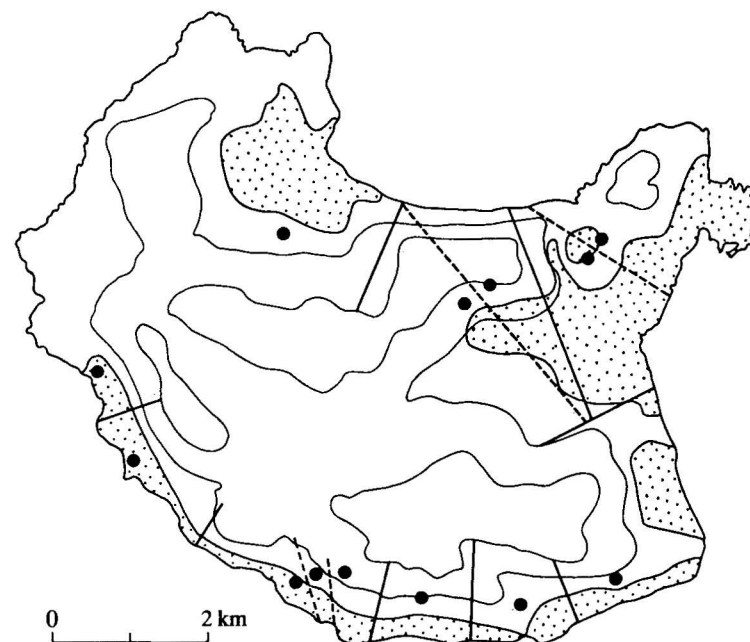


Figure 4. Spacing of chambered cairns on Rousay, Orkney, which may reflect territorial behaviour. (Contours at c. 100 m intervals, modern arable land stippled.)

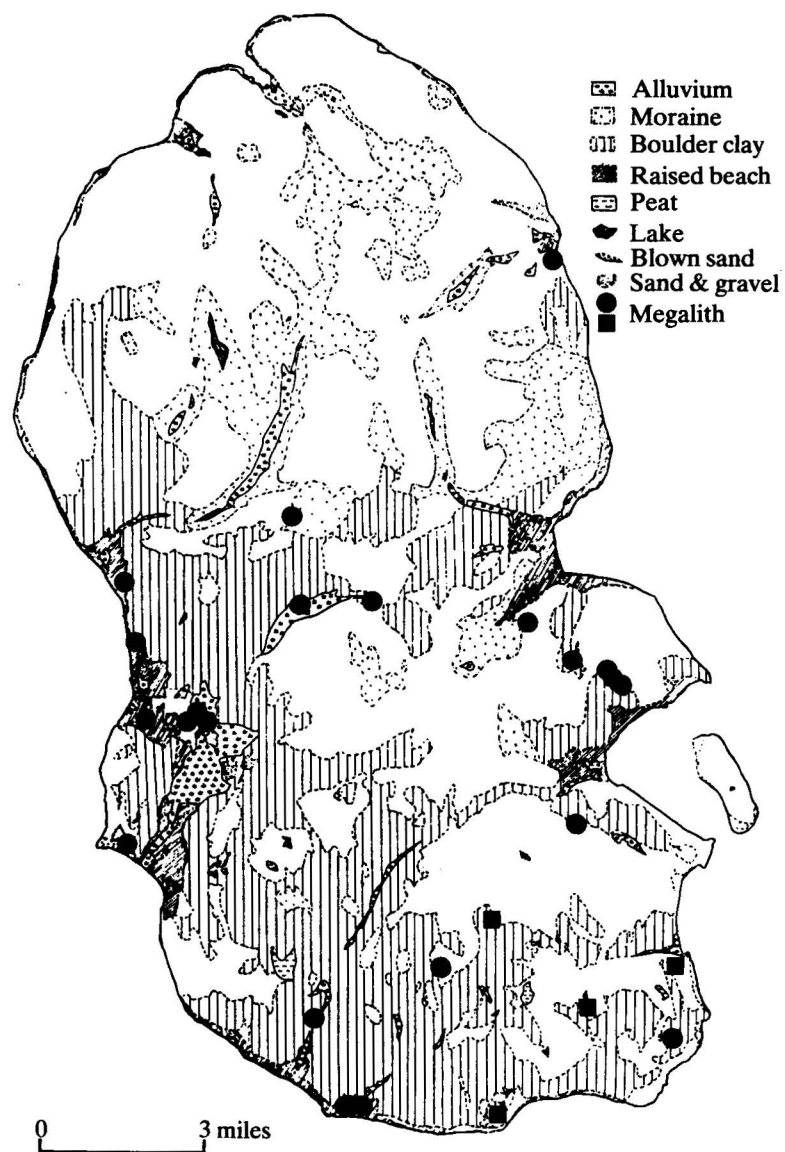


Figure 5. Location of Arran chambered cairns in relation to surface geology, emphasising environmental constraints (after Davies 1946).



Figure 6. Location of Arran chambered cairns with notional territorial divisions (based on equal distance) to emphasise possible social factors. (Contours at c.100 m intervals, modern arable land stippled.)

forgotten, we should expect to find the most fertile areas, or those otherwise most apt for settlement, to be the home of a whole long series of tombs of different date, reflecting occupation in the favoured area.

In practice one tomb was no doubt replaced by another. And that this should be so in no way invalidates our hypothesis. Indeed what we should expect to see is not a simple territorial spacing of single cairns, but of single cairns and of *clusters* of cairns.

I have argued elsewhere (Renfrew 1973a, 135), following the earlier suggestion of Childe (1942) that this is precisely what one does see on the Orcadian island of Rousay. And the territorial argument is made more coherent if we think not simply in terms of equal-distance territories as indicated by means of Thiessen polygons (figure 4) but more carefully about the siting of the tombs.

Turning now to Arran, it is appropriate to refer first to the careful environmental study made twenty years ago by Margaret Davies (1946). Her map (figure 5) elegantly documents her thesis that the settlers in Arran were avoiding the heavier, and probably more thickly forested boulder clays. This environmental analysis is no doubt the first consideration. For it is axiomatic that each territory represents in the first instance the home area of a group of people. The social factors working towards a modular arrangement are therefore subordinate to the environmental ones which may distort it. Even so, however, a simple equal-distance map obtained by drawing Thiessen polygons (figure 6) lends some support to the notion of territorial arrangement. Probably the pair on the east side, and the group of three on the west, might be regarded as clusters of successively used cairns, but this is mere speculation.

I believe that the hypothesis plausibly survives these two tests, and of course it must be further tested in the further regions under consideration. It would of course be desirable to test it more rigorously and formally, perhaps by means of a nearest-neighbour analysis. But it would first be necessary to factor out the environmental considerations, and to allow for irregularities in the terrain. And secondly some further criterion of simultaneity would be desirable. Work is continuing at present on the siting of the Rousay cairns, and it may be that further progress will be made.

Finally, the second condition of the three implies that the territories defined by such a spatial analysis should indeed be territories of living groups, rather than reflecting some other special symbolic arrangement. That the territories are generally those of living groups seems inherently plausible, although societies certainly existed

where this is not so. Perhaps in this instance the onus may rest upon whoever wishes to challenge the hypothesis to present another to account for the segmentary pattern observed?

Population Stress in Segmentary Societies

The assertion that the stone monuments in several regions of north-western Europe may be regarded as territorial markers in segmentary societies may not seem a very remarkable one: all the ideas which go to make up such a view have been expressed before, although perhaps not quite in this form. At the same time there will be critics particularly aware of the difficulties in demonstrating such a proposition – problems of the contemporaneity of the use of monuments in a given area – and of the various cases to which it does not apply. At least, however, it has the merit of leading us to talk about the social structure and economic basis of the societies themselves, and to assess changes initiated outside in terms of their effects upon those structures.

There are three special features in the environment of these societies which must, I suspect, feature in any explanation of the monuments themselves. All three arise from their situation along what Giot (1963, 3) and Powell (1969, 270) have called the 'Atlantic facade': 'a phenomenon against which westward moving cultures were halted and accordingly modified'. The first is precisely this absence of accessible lands to the west: location on the extreme edge of a major continent establishes a demographic system different to that arising from residence in the middle of the land mass. And secondly, of course, the coastal regions, as well as the lower reaches and estuaries of the major rivers, offered important food resources for the hunting and gathering populations who were flourishing there before the inception of farming. Grahame Clark has recently stressed (1974) the importance of fishing as a major resource for certain Scandinavian groups who were using megalithic monuments, and has, of course, written several studies on the food resources of their predecessors. It was, I think, Gordon Childe (1925, 133) who first indicated the possibility of a significant relationship: 'The great centres of megalithic architecture in Europe are precisely those regions where the palaeolithic survivals are the most numerous and best attested'. And once again it is Humphrey Case, who in an article full of relevant insights (1969, 12), has followed through a possible implication: 'The passage-grave may indeed be an invention of Atlantic Mesolithic communities'.

With these two features go an obvious third, which has been more

often stressed in the past: the ease of communication along the Atlantic coasts, along the 'western seaways'. This idea has recently been re-examined by Bowen (1972) in an illuminating way. And of course in stressing the ease of communication along the coasts, and no doubt the frequency of voyages by early fishermen, one need not be thinking in terms of particularly long-distance voyages, although these cannot be excluded.

In its simpler form the model to be proposed does not need to make reference to this existing mesolithic population, or not at least to special features that distinguish it from the mesolithic population of continental Europe. It is necessary first to consider the changes in population density arising from the development of farming techniques in a region formerly only sparsely occupied by hunter-gatherers. (The possible higher density of maritime groups of fishers is considered below.) It is generally accepted that in Europe as in other areas (Braidwood and Reed 1957) the development of farming resulted in substantial population increase, perhaps from a density of 0.1 to around 5 persons per square kilometre, although in the argument that follows the precise figures are not significant so long as a substantial increase is agreed.

Ammerman and Cavalli-Sforza (1973) have put forward a remarkably informative mechanism, a wave of advance model, for the spread of farming in early Europe. In it the speed of spread is related to the pattern of population increase. They visualise a process of 'demic diffusion', where there is modest local migratory activity which is random in direction. When the new mode of production makes possible an increase in population numbers, a wave of population expansion sets in. Their model of the wave of advance is given in figure 7.

For our present purposes, however, it is not the uniformity of this advance which is important, but that the pattern of population growth in each area is likely to be roughly the same. When a population enters a hitherto uninhabited area, or where, as in this case, a new mode of production makes possible a very rapid rate of increase, the pattern of growth is at first exponential (Maynard Smith 1974, 16): the rate of increase of population is proportional to population density.

$$dx/dt = rx \quad x = x_0 e^{rt}$$

Birdsell (1957) has demonstrated such a growth pattern for instance in Pitcairn Island (figure 8).

However, when the population begins to approach a level that

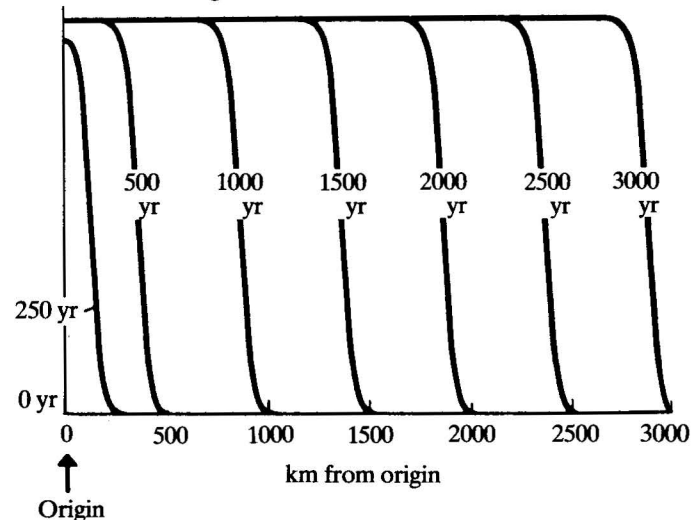


Figure 7. Wave of advance model for the spread of farming in Europe (after Ammerman and Cavalli-Sforza 1973). Only one half of a section through the model is reproduced: the full model is generated by rotation through 360° about the vertical axis (i.e. it is symmetrical in distance from the origin).

exhausts the available resources, the rate of increase diminishes, and may reach a steady value. The logistic equation, $dx/dt = ax - bx^2$, describes such a pattern of growth, examples of which are seen in many living populations, from yeast to human (Maynard Smith 1974, 18): figure 9. Naturally the curve will have a different shape, depending upon the growth rate, and the population density at saturation (the 'carrying capacity').

So far this is merely the kind of simplification that is commonly made when speaking of demographic process, and naturally masks the complexity of any real case. It is of course, in the upper part of the logistic growth curve that population stress will arise. In the exponential curve, on the other hand, with no inhibiting environmental limitations, both population and the rate of population growth continue to increase. Such a growth pattern is seen when the death rate and the birth rate are both stable, and the latter greater than the former. In the logistic curve, although the population continues to grow for a considerable period, it ultimately grows more slowly: the rate of increase, although positive, is diminishing (figure 10).

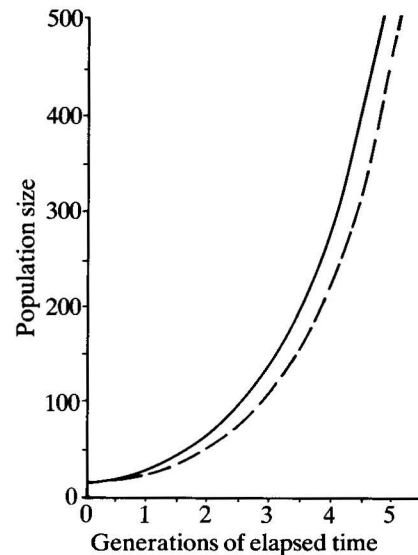


Figure 8. Exponential (unrestricted) growth of population, as seen on Pitcairn Island. The initial growth of population in a newly colonised territory takes this form (after Birdsell 1957).

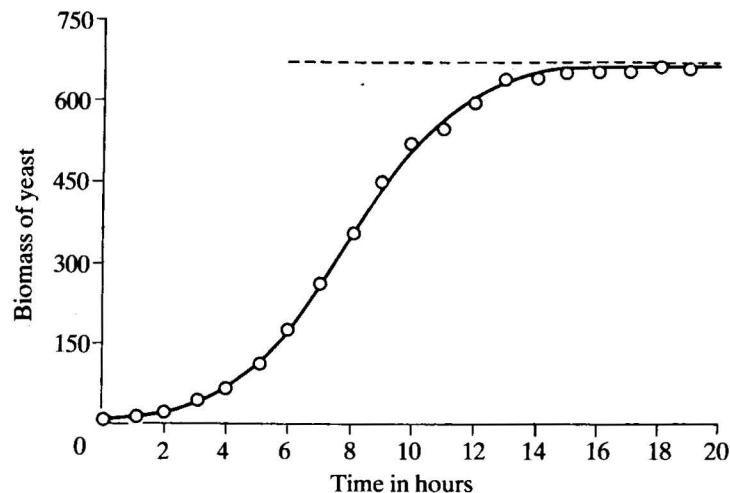


Figure 9. Logistic growth curve, as seen in the development of a yeast population. This is the pattern of growth commonly taken when environmental constraints limit the continued growth of population (after Maynard Smith 1974).

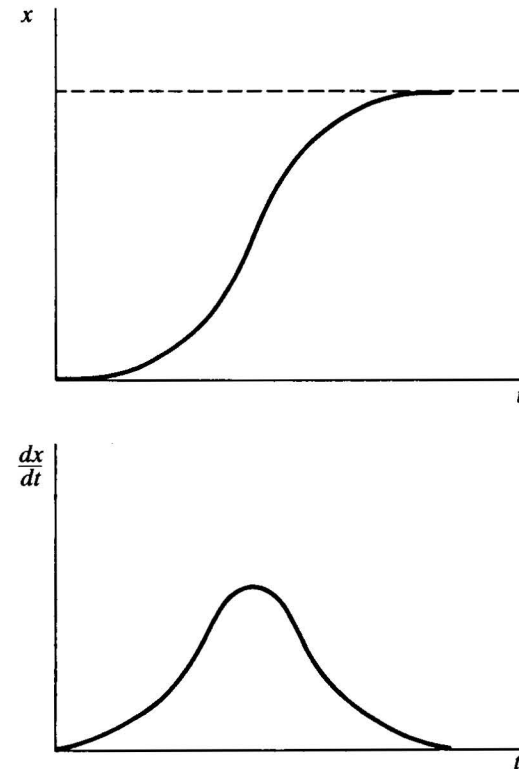


Figure 10. Growth of population (*above*) for logistic growth, and *rate* of growth of population (*below*) on the same time axis.

The rate of increase will diminish only if either the death rate is increased or the birth rate reduced. It is here that the notion of population stress is relevant. I am using it here to indicate not so much high population density (although this in itself can cause stress) but the working in society of those processes which inexorably cause a reduction in birth rate, and their accompanying side effects.

The whole field of demographic studies in early societies is a difficult and uncertain one (Spooner 1972), and while the logistic growth pattern has been demonstrated in several cases, the precise mechanism of its operation is not well understood. What has been fairly well established, however, is that the population level, the 'saturation point' at which the growth stabilises, is generally some

way below the theoretical carrying capacity of the land (Binford 1968). In other words population in most animal and traditional rural human populations does not go on increasing until mass starvation and deprivation produce a substantial increase in death rate in some Malthusian cataclysm, thereby ensuring that the carrying capacity is not exceeded and that the logistic pattern prevails. Instead the stabilisation is at a lower density, and often seems to come rather from a reduction in the birth rate (or rather infant survival rate), whether through increased age of marriage, reduced conception in wedlock (or out of it for that matter), increase in abortion or infanticide. My point here is that during the period of sharpest decrease in the birth rate, however that reduction is achieved, the adjustments in society will be most painful – more painful, I suggest, than when the birth rate is stable whether at the higher level (with population growth) or at the lower level (with zero growth). For it is *change* in habitual life patterns, in an established pattern of existence, that is most productive of stress.

Now one interesting feature of the wave of advance model, not specifically singled out for comment by Ammerman and Cavalli-Sforza, is that so long as the wave is advancing, while farming continues to be introduced to new lands, there is always a net outflow of population, a leakage, so to speak, from each region on the current periphery, the frontier, as the logistic curve approaches its stable population density. This then permits the approximation to a logistic growth pattern without so rapid a reduction in birth rate. The lands outside the frontier are accepting a small population increase from the agricultural donor lands. The net result may be that while the resultant population in the donor area undergoes logistic growth, the rate of live (and surviving) births need not decrease so rapidly as this would otherwise imply. Some 'overshooting' of the saturation level is possible because the receptor land beyond the frontier takes up the excess (figure 11).

The continuing expansion of the wave of advance, then, cushions the expanding society against some of the effects of the ending of its population growth, and protects it from the necessity of a very rapid cut-back in the birth rate.

Now the interesting thing is that when the wave reaches a barrier that it cannot cross – when a net outward migration of population is no longer possible – this cushioning effect ceases. The society at the end of the line has to undergo an unmodified pattern of logistic growth, including the reduction in birth rate in the later stages, and this more rapidly than previously experienced by neighbouring

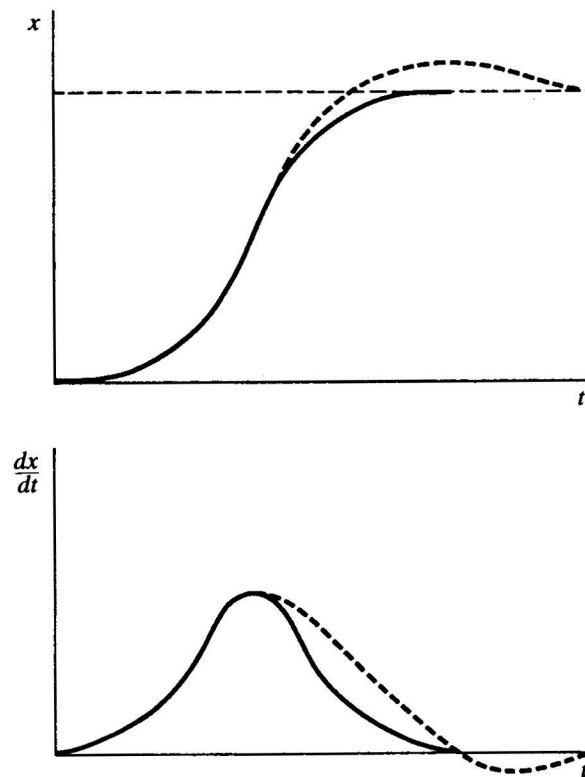


Figure 11. Growth of population (*above*) and rate of growth (*below*) when no migration takes place (unbroken line) and when some outward movement takes place at high population density (broken line).

It is suggested that the wave of advance pattern normally proceeds with some outward movement of population (broken line) but that when the wave meets the Atlantic facade this is prevented and the situation is shown with the unbroken line. The rate of population growth (*below*) declines more rapidly in the latter case when the wave meets the facade, creating demographic stress. The stress arises not only from high population density (high x) but particularly from the sharp decline in rate of growth (in dx/dt).

societies which have already fully accomplished the agricultural transition with all its demographic consequences. The stress in such societies will consequently be higher.

Precisely such conditions apply on the Atlantic facade 'against

which westward moving cultures were halted and accordingly modified'. On this model, therefore, the segmentary societies which developed with early farming in the north and west of Europe would, after a few generations of uninhibited growth (the early and almost exponential part of the logistic curve), be suffering population stress as the birth-rate decline set in.

A similar situation would prevail in any situation where population growth proceeds in effectively virgin land, and where the outflow of population is strongly inhibited – as, for instance, in the early colonisation of the Pacific islands.

Demography and Megaliths

We have suggested so far that at a period shortly after the inception of farming in each area, the inhabitants of the regions of Atlantic Europe may have been subject to social stress arising from the ensuing demographic changes. The first and obvious source of stress may simply have been the high population density, greater than any previously seen in the region. Martin (1972, 443–4) has speculated profitably on the possible effects in human societies when the pace of population growth exceeds that of behavioural adaption:

Experiments with animals show that certain pathological effects appear at population densities above that for which each species has been adapted, and it is quite conceivable that similar effects may eventually emerge in human societies, such as:

1. general individual loss of weight
2. digestive disorders and kidney ailments
3. circulatory disfunction (e.g. high blood pressure)
4. disruption of parental behaviour
5. disruption of social behaviour
6. decline in fertility
7. premature death

In the case in question we are dealing not solely with a fairly high population density (which is by no means a special feature of Atlantic Europe) but of the stress factors arising from a decline in birth rate, or from the more general causes, as yet little understood, of which the birth rate decline is the result.

It is, of course, the behavioural adaptation to the situation which interests us. In some cases a consequence, or at least a correlate, of increasing population density, and perhaps of other aspects of demographic stress, is an increase in specialisation, and a movement towards centralisation, which through greater efficiency per-

mits what in effect is an increased carrying capacity (Dumond 1972, Sherratt 1972). This, by raising the effective ceiling on population growth, alleviates some sources of stress (although not of course stress arising from population density itself).

However, it seems likely that an alternative adaptation operated in Atlantic Europe at this time. For as we have seen, it is only rather later, in certain areas, that the archaeological evidence indicates the possibility of chiefdom society (chapters 7 and 8). There is no evidence in the areas under detailed consideration, for instance in Arran or Rousay, of any early centralising tendency, although as already indicated, it may be relevant that towards the end of the neolithic in Orkney larger public works (the Ring of Brogar and the Stones of Stenness) beyond the scope of the earlier segmentary units were constructed.

Instead of developing larger units, with a central organisation capable of administering specialised production and distribution, the segmentary societies of north-western Europe responded, in some instances at least, by reinforcing their own existing organisation, resisting change rather than exploiting it. In many the group and territorial identity was symbolised in the construction of a ritual centre. And one must no doubt see in this a means of reinforcing traditional norms of behaviour and traditional sanctions, some of which probably were already in existence to exert some kind of control upon the birth rate. When this rate had to be further reduced – as the logic of the logistic curve inexorably demands – existing conventions and sanctions of regulation would have to be more rigorously applied. The alternative, an uncontrolled increase of population beyond the carrying capacity appropriate to the mode of production available, would be a substantial increase in the death rate and with it probably much worse stresses, and possibly the total fragmentation of the social groups.

The pattern of population increase along the Atlantic seaboard was thus very different from that in the centre of Europe, setting up very different pressures upon the segmentary societies which occupied it.

As we saw earlier, there is a further factor which worked to make the demographic system there a special one: the relatively high density of the existing hunter-gatherer-fisher population. In many of the areas earlier discussed which may have seen the independent development of monument building around 4000 BC, there was a substantial population already before the arrival of the first farmers. Based as it was upon the exploitation of marine resources, its

population density is likely to have been larger than that seen in inland Europe. In Portugal, as in Brittany, there are shell middens reflecting the activity of this population, and in Britain and Ireland there are abundant traces of mesolithic occupation. The Ertebølle culture of Denmark is likewise well known.

There was thus already a substantial population, with an adequate subsistence base in the area before the arrival of farming techniques. In some areas this population may have resisted change and kept to its traditional economy, while farmers began to practise agriculture and stock rearing inland. Some of the later dates for the Portuguese shell middens may hint as much. But in other areas these fisher-gatherers must themselves have adopted farming practices, while not of course giving up their valuable existing food resources. The result would no doubt be a rapid population increase, at first making unnecessary whatever controls on birth rate operated in these maritime societies. But soon they would again be called into operation. And the very high population density in these favoured regions, blessed with abundant maritime resources as well as the practise of farming may itself have worked to produce conditions of particular stress.

It is relevant to remember here that these groups will already have had their own identity, and no doubt concepts of territoriality. Moreover the custom of burial in stone graves seen already in Brittany at Hoëdic and Tévéc (the former with a date of 4625 ± 300 bc, Gif-227, calibrating to c. 5550 bc) may have had a bearing upon the precise form of territorial marking adopted. Further work is needed to elucidate the social structure of these pre-farming communities. It must have had a significant bearing upon that of their agricultural successors.

Conclusion

In this paper, it has been argued that the stone built monuments of northern western Europe may have had essentially independent origins in several regions. Although the radiocarbon dates cannot be held to establish this, they do at least open the possibility.

The apparent unity of the megalithic phenomenon may instead be the result of factors operating which are special to the Atlantic facade. It is suggested that we should view the monuments as territorial markers in segmentary societies. It is possible to see how population stress was exacerbated in this area by the difficulty of 'overshooting', which was possible in other areas of Europe as the farming population grew towards a notional saturation point. This

stress, it is suggested, favoured a stronger territorial expression, and favoured the development of just such territorial markers.

It is relevant to ask, in conclusion what the possibilities may be for testing so general a model. For without the possibility of such testing, the above scenario can be little more than a word picture, plausible enough in itself, perhaps, but difficult to examine constructively.

I hope indeed that some of the ideas here may suggest possibilities of testing. But already some general consequences are clear. In the focal regions of independent development we expect a period of several generations after the adoption of farming practice before the inevitable population stress is felt, and before we expect territorial marking to become prominent. This period of time will depend on the initial density of settlement and on the ultimate carrying capacity. In favourable cases this is a figure for which an estimate can in fact be reached, and compared with the observed lapsed time between first farming and first stone monuments in the region.

Secondly it follows that the stress in question should be widely felt through quite a large region, so that territorial monuments should appear almost simultaneously in quite a wide area.

Thirdly the form of monument adopted in each area will depend very much on local factors. At first there may be little standardisation within the area. If there are local antecedents, as in Brittany, their own form is likely to be influential. If not, a borrowing of architectural devices from adjacent regions would be expected, but with idiosyncratic local modifications.

Any lands first colonised after the development of monumental territorial marking in the homeland are of course likely to reflect similar customs, and there is nothing in the model which excludes the secondary development of monument building in this way. Indeed the colonisation of the Polynesian islands may have been of this kind, since there seem to be strong local similarities in the forms of the territorial customs adopted in each.

It is therefore no part of my argument to deny the frequency of contact between communities along the Atlantic seaboard, or the significance of these contacts for the selection of architectural forms for the solution of specific design problems (cf. Fleming 1972). We have undoubtedly a great deal to learn from a study of maritime interactions in this area. I wish to stress simply that we shall not understand the changes that took place without taking full account also of the locally based factors which determine the dynamics of culture change.

[1976]

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